

# RESEARCH, DEVELOPMENT & TECHNOLOGY TRANSFER QUARTERLY PROGRESS REPORT

Wisconsin Department of Transportation  
DT1241 02/2011

## INSTRUCTIONS:

Research project investigators and/or project managers should complete a quarterly progress report (QPR) for each calendar quarter during which the projects are active.

<b>WisDOT research program category:</b> <input type="checkbox"/> Policy research <input type="checkbox"/> Other		<input checked="" type="checkbox"/> Wisconsin Highway Research Program <input type="checkbox"/> Pooled fund TPF#	Report period year: <b>2012</b> <input type="checkbox"/> Quarter 1 (Jan 1 – Mar 31) <input type="checkbox"/> Quarter 2 (Apr 1 – Jun 30) <input checked="" type="checkbox"/> Quarter 3 (Jul 1 – Sep 30) <input type="checkbox"/> Quarter 4 (Oct 1 – Dec 31)
Project title: <b>Aesthetic Coatings for Concrete Bridge Components</b>			
Project investigator: <b>Dr. Al Ghorbanpoor</b>		Phone: <b>414-229-4962</b>	E-mail: <b>algh@uwm.edu</b>
Administrative contact: <b>Nikki Hatch</b>		Phone:	E-mail:
WisDOT contact: <b>Travis McDaniel</b>		Phone: <b>608-266-5097</b>	E-mail: <b>travis.mcdaniel@dot.state.wi.us</b>
WisDOT project ID: <b>0092-11-07</b>		Other project ID:	Project start date: <b>8/22/2012</b>
Original end date: <b>11/21/2014</b>		Current end date: <b>11/21/2014</b>	Number of extensions: <b>0</b>

## Project schedule status:

☒ On schedule      ☐ On revised schedule      ☐ Ahead of schedule      ☐ Behind schedule

## Project budget status:

Total Project Budget	Expenditures Current Quarter	Total Expenditures	% Funds Expended	% Work Completed
\$120,000.00	\$15,000.00	\$15,000.00	12%	15%

## Project description:

The objectives of this study are to investigate methods and products that may be used in the aesthetic and protective coating of bridge concrete components and to develop a guideline for cost-effective bridge coating practices for concrete members. A series of concrete coating systems will be identified and tested in the laboratory to evaluate their performance under simulated environmental conditions that are similar to those experienced by bridge components in Wisconsin. Wisconsin bridge sites, where coating failures and problems have occurred, have been visited to identify and evaluate the structural details and other factors that have contributed to such coating failures. Upon completion of the testing and evaluation program, guidelines and specifications language will be developed for selection, application, and maintenance of such coating materials. Also, recommendations will be made to WisDOT for implementation of the results of this study.

**Progress this quarter** (includes meetings, work plan status, contract status, significant progress, etc.):

The research staff has begun the review of available literature concerning standards, guidelines, materials, formwork, surface preparation, application, coating testing procedures, and long term performance of various concrete coating materials for highway bridges and similar applications. From the information gathered through the literature review, a questionnaire has been prepared and attached to this progress report for approval and distribution among contractors, regional Wisconsin DOT branches, and other State DOT.

Field visits were made to two bridges located in Beloit. During the visits, the surface preparation and applied concrete coatings were observed on a bridge currently under construction. The concrete coatings on a similar bridge were also examined during the site visit. The factors affecting the successes and failures of the coating systems on the existing bridge were identified.

Several concrete coating materials manufacturers have been contacted to obtain recommendations on appropriate coating systems to include in this study. Most of these manufacturers have already provided the research staff their recommendations. A draft interim report is currently being prepared which will include the manufacturers' recommended coating systems, information gathered from the literature review, and a revised work plan. A draft interim report will also include the results of the survey after it is completed.

**Anticipated work next quarter:**

The research staff will continue the review of available literature. The questionnaires will be sent out to contractors, regional Wisconsin DOT branches, and other State DOT. When the questionnaires are received the results will be reviewed. The interim report will be completed and submitted to WisDOT.

**Circumstances affecting project or budget:**

None.

Attach / insert Gantt chart and other project documentation

Quarters/Tasks	1	2	3	4	5	6	7	8	9
1. Literature Review	<div><div></div><div></div></div>								
2. Survey	<div><div></div><div></div></div>								
3. Interim Report	<div><div></div><div></div></div>								
4. Laboratory Testing	<div><div></div><div></div></div>								
5. Future Research	<div><div></div><div></div></div>								
6. Project Deliverables	<div><div></div><div></div></div>								

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Staff receiving QPR:	Date received:
Staff approving QPR:	Date approved:

## **Questionnaire for Contractors**

### **Wisconsin Highway Research Program**

“Aesthetic Coatings for Concrete Bridge Components”

**Note:** The purpose of soliciting your input through this questionnaire is to gather data on concrete aesthetic and protective coatings/stains used for bridge and highway components. The requested data will be used as a part of a new study, sponsored by the Wisconsin Highway Research Program (WHRP), to evaluate the performance of coating systems for highway applications. The research staff will share the results of this study with you to assist you in your future selection of coating materials for highway applications. The information given in this survey will remain confidential.

**Please E-Mail or Return the Completed Questionnaire To  
the Wisconsin Highway Research Program’s  
Principle Investigator for This Project**

Professor Al Ghorbanpoor, PhD, P.E.  
University of Wisconsin-Milwaukee  
3200 N. Cramer Street  
Milwaukee WI, 53221

E-Mail: ([algh@uwm.edu](mailto:algh@uwm.edu))

Tel: 414-229-4962

Any questions regarding this questionnaire  
can be addressed by Dr. Ghorbanpoor

**Please Return the Completed Questionnaire By  
October 31, 2012**

## **Contractor Questionnaire**

1. Please list the commercial names and manufacturers of all colored coating materials which your company has used on concrete bridge and highway components in recent years.

2. What types of surface preparations for colored concrete sealers and coatings have been used (e.g. grinding, sand blasting, water jetting, etc.)?
3. Which application methods have been used for each of the colored concrete coatings listed in question #1 (e.g. spray, roller, sponge, etc.)?
4. Which types of form release agents have been used in recent years (e.g. barrier release agents, reactive release agents, water based release agents, etc.)? Please provide manufacturer and product.
5. Please specify any products or specific concrete surface cleaning procedures used before applying colored concrete coatings or sealers for the above listed release agents.
6. Are specific types of form release agents more effective for particular formwork materials (e.g. more effective on wood forms, less effective on steel forms, etc.)?
7. Are there colored concrete coating products that are not currently on the WisDOT approved list but would be preferred for use on bridge and highway components?
8. Do concrete surfaces resulted from using different form materials affect the performance of colored concrete coatings? If so, which formwork material does produce the best performance?
9. Please provide any additional information or general comments on colored concrete coatings which may aid to the success of this study.

# **Questionnaire for State Highway Agencies**

## **Wisconsin Highway Research Program**

“Aesthetic Coatings for Concrete Bridge Components”

**Note:** The purpose of soliciting your input through this questionnaire is to gather data on concrete aesthetic and protective coatings/stains used for bridge and highway components. The goal of this project is to test the performance of a series of coating systems for highway applications. This project is carried out through the Wisconsin Highway Research Program and your input will aid the successful completion of this study. The research staff will distribute the results of this study to assist you in your future selection of coating materials for highway applications. The information given in this survey will remain confidential.

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the Wisconsin Highway Research Program’s  
Principle Investigator for This Project**

Al Ghorbanpoor, PhD, P.E.  
3200 N. Cramer Street  
Milwaukee WI, 53221

E-Mail: ([algh@uwm.edu](mailto:algh@uwm.edu))  
Tel: 414-229-4962

Any questions regarding this questionnaire  
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**Please Return the Completed Questionnaire By  
October 31, 2012**

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### **Questionnaire**

1. Does your state maintain an approved colored concrete coating products list for bridge members? If so, please provide list(s), or website link.
2. Please list all waterborne epoxy, aliphatic polyurea, and polyurethane colored concrete coatings your state has used in the last few years for bridge and highway components, along with the following information:
  - a. The application of the coating (e.g. parapets, girders, piers, abutments, wing walls, sound barriers, etc.).
  - b. The purpose of the coating (e.g. aesthetics, concrete coloring, rust inhibitor, chloride protection, graffiti resistance, etc.).

<u>Product Name</u>	<u>Manufacturer</u>	<u>Application</u>	<u>Purpose</u>
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3. Please list the installation techniques used for each of the colored concrete coatings listed above.
- The surface preparation procedure (e.g. sand blasting, acid etched, high pressure water jet, etc.).
  - The application technique of the coating or stain (e.g. spray, roller, sponge, etc.).
  - The type of form release agent used (e.g. barrier release agent, reactive release agent, water based release agent, etc.).
  - The surface cleaning procedure used to remove the release agent from the surface to which the coating was later applied.

Concrete Coating	<u>Surface Preparation</u>	<u>Application Technique</u>	<u>Form Release Agent</u>	<u>Surface Cleaning Procedure</u>

4. Please list any colored coating problems and successes associated with the previously listed concrete coatings (e.g. durability, peeling, fading, blistering, adhesion, vandalism, etc.)

#### **Coating Problems**

Concrete Coatings	Application Problems	Performance Problems	Reason for Problems

#### **Coating Successes**

Concrete Coatings	Application Successes	Performance Successes	Reason for Success


5. Does your state/office maintain standard structural details and specifications for colored coatings applications on concrete components (parapets, piers, abutments, wing walls, sound barriers, etc)?  
(Please state yes or no);\_\_\_\_\_ If yes, please provide a reference or a website link if available.
6. Has your state experienced any specific colors for concrete coatings that are more susceptible to change or fading? If so, please list such coating(s), color(s), and manufacturer(s).
7. Do concrete surfaces resulted from using different formwork materials affect the performance of colored concrete coatings? If so, which formwork material produce the best coating performance?
8. Does your state maintain any evaluation program for colored concrete coatings? If so, please specify below or provide a web link if available.
9. Does your state/office test or evaluate colored concrete coatings or other products? If yes, please describe your testing program or provide a web link if available.
10. Please provide any additional information or general comments on colored concrete coatings or other products which may aid to the success of this study.



**Questionnaire for WisDOT Regions**  
**Wisconsin Highway Research Program**  
“Aesthetic Coatings for Concrete Bridge Components”

**Note:** The purpose of soliciting your input through this questionnaire is to gather data on concrete aesthetic and protective coatings/stains used for bridge and highway components. The requested data will be used as a part of a new study, sponsored by the Wisconsin Highway Research Program (WHRP), to evaluate the performance of coating systems for highway applications. The research staff will share the results of this study with you to assist you in your future selection of coating materials for highway applications. The information given in this survey will remain confidential.

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**the Wisconsin Highway Research Program’s**  
**Principle Investigator for This Project**

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Tel: 414-229-4962

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**Please Return the Completed Questionnaire By**  
**October 31, 2012**

**Wisconsin DOT Region Survey**

1. Is there a list of colored concrete coatings that have been used in the past several years in your Region?  
If yes, please provide or attach list(s) with coating type, manufacturer, and product.
  
2. Which colored coatings have performed well, and which have performed poorly?

3. Has your Region used any graffiti resisting coatings? If so, please specify such coating(s) and their performance.
4. Which types of concrete coating failures has your Region experienced in the past, which of these failures are most prevalent?
5. Please provide a list of bridges in your region with colored concrete coating failures.
6. Are there specific structural details or areas of bridges which experience more colored coating failures? If yes, please specify (e.g. smooth surfaces, horizontal or vertical surfaces, southern exposure, etc.).
7. Do concrete surfaces resulted from using different formwork materials affect the performance of colored concrete coatings? If so, which formwork material results the best performance?
8. Please list any additional information or comments that may aid to this study.
9. May we have the contact information for the person who is filling out this questionnaire? The results of this study will be forwarded to you.  
Name:  
Address:  
  
Email:  
Telephone #: